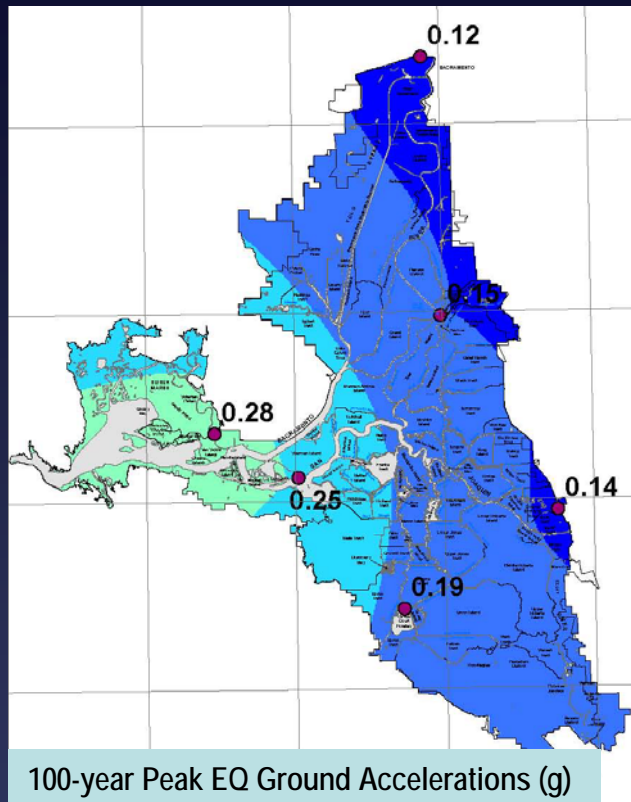


# Delta Risk Management Strategy



Presentation by:

**Leslie F. Harder, Jr.**  
Deputy Director  
Department of Water Resources

April 20, 2007



# Delta Risk Management Strategy

- Evaluate current and future risk
- Identify consequences
- Identify risk reduction measures, including levee upgrades and land use changes
- Evaluate alternative strategies to reduce risk



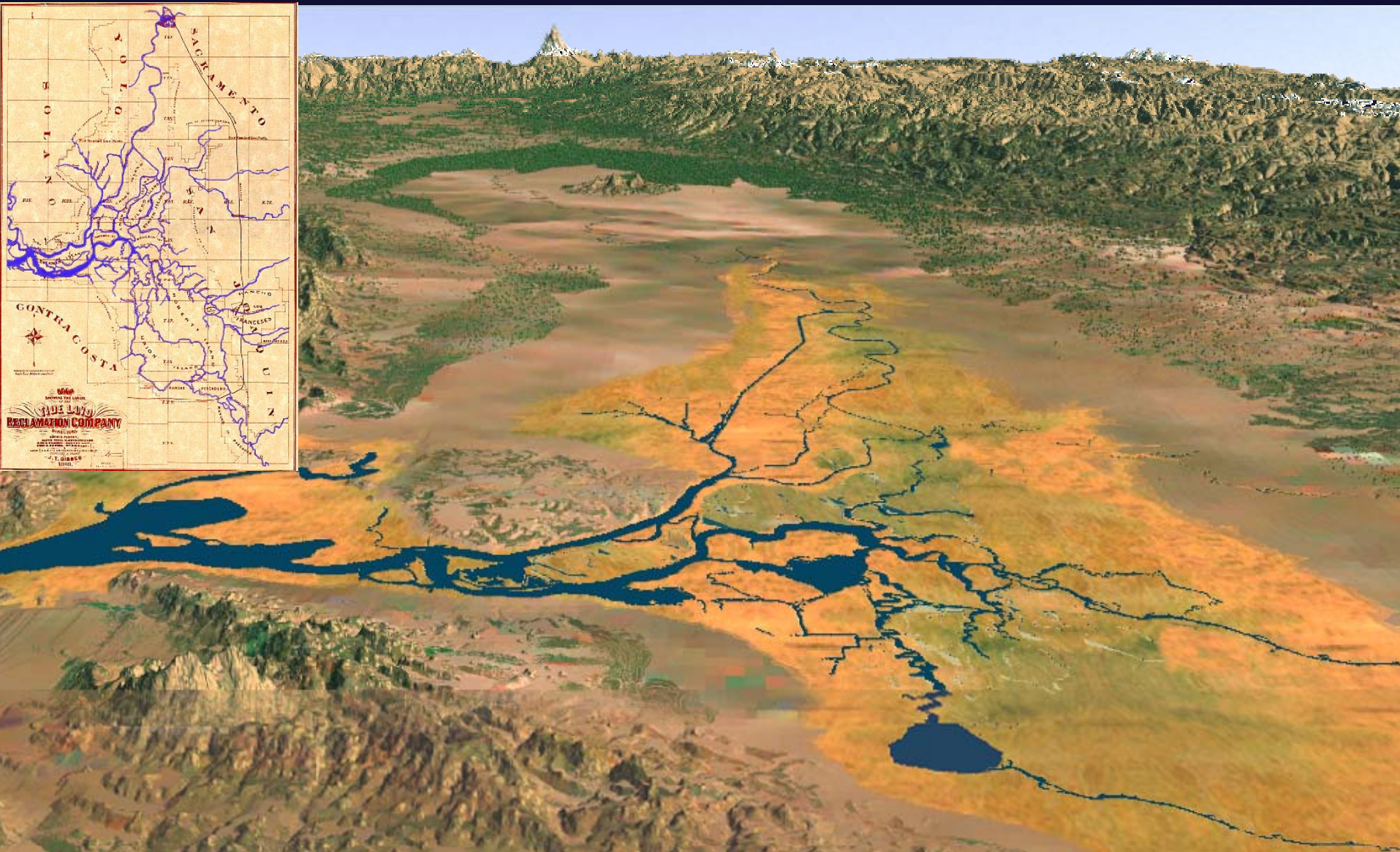
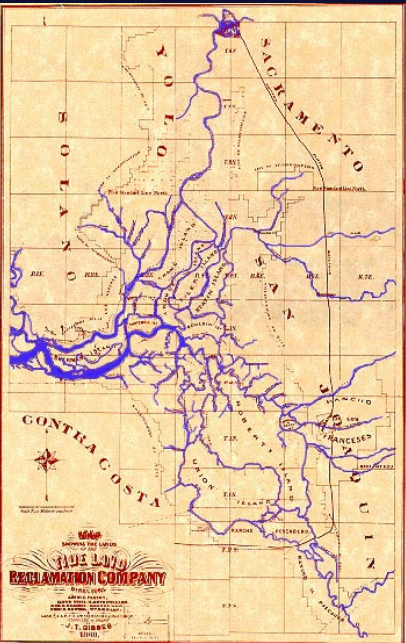
Phase 1 Report on Evaluation of Risks

Phase 2 Report on Alternative Strategies to Reduce Risk



# Sacramento – San Joaquin Delta

Reclamation of a Tidal Marsh – beginning in late 1860's





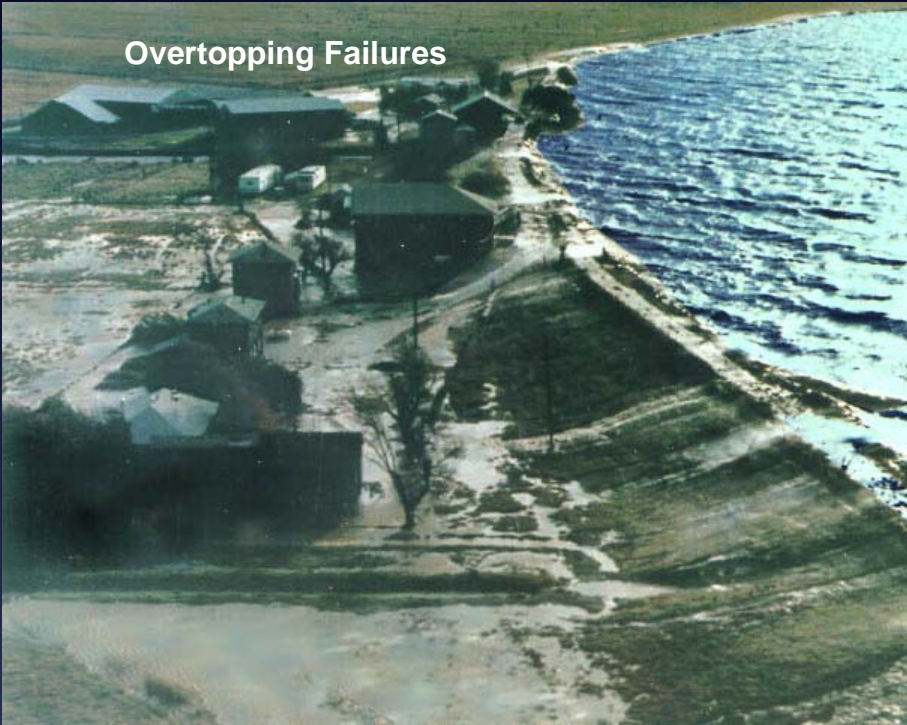
## Design and Construction History





# *Risks to Levee Integrity*

Overtopping Failures



High Tides & Winds



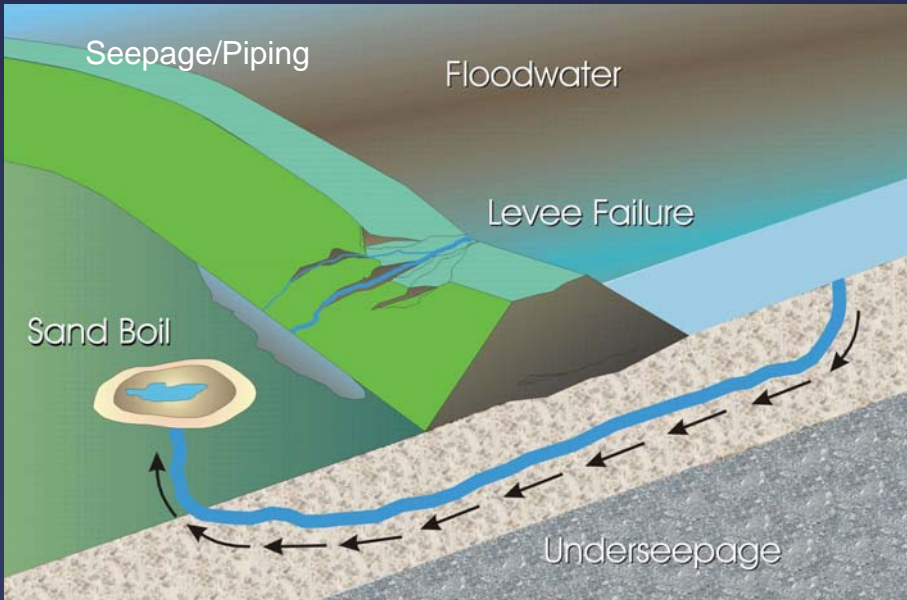
Seepage/Piping

Floodwater

Levee Failure

Sand Boil

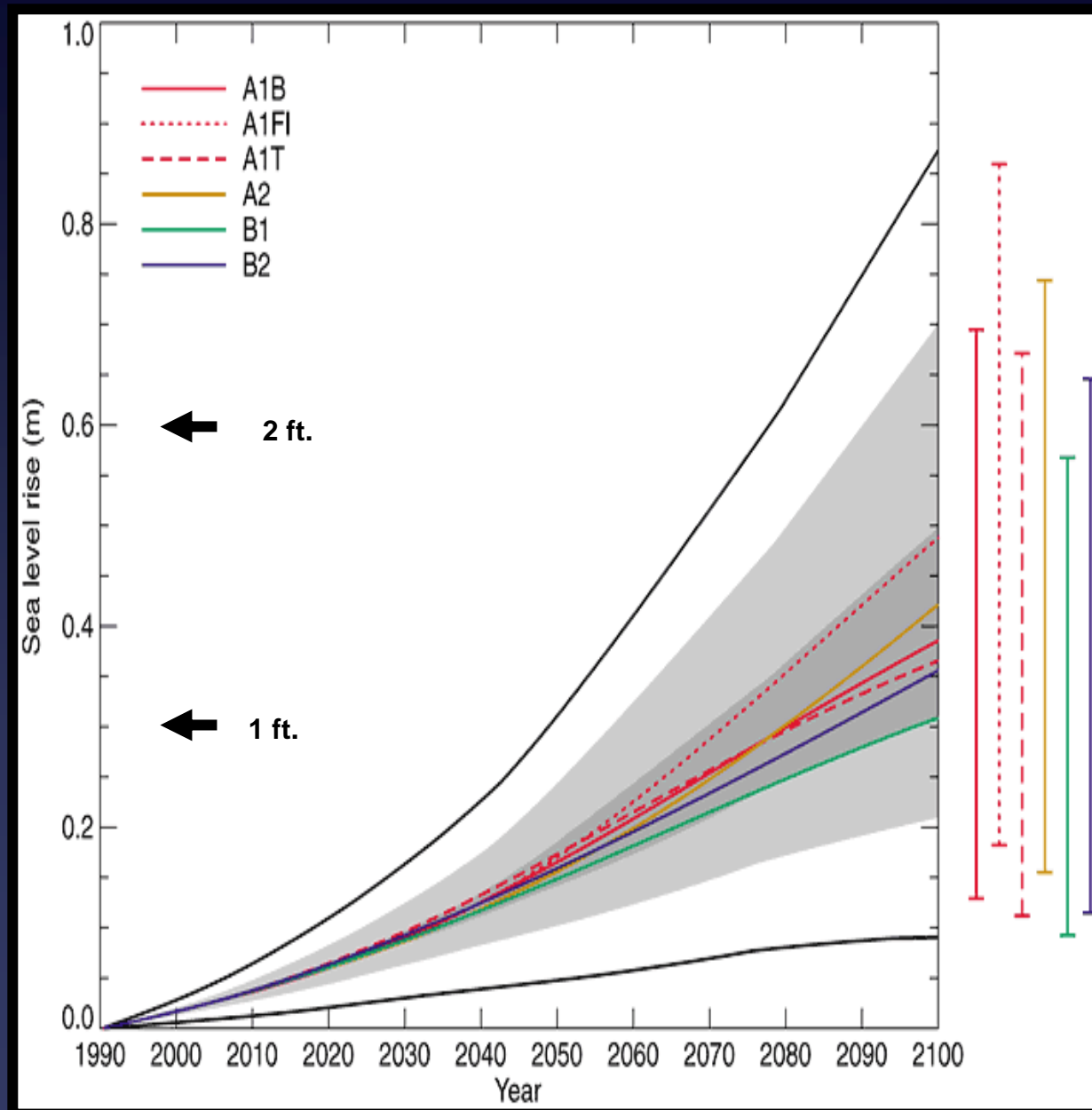
Underseepage



Sudden/Unexpected Levee Failures



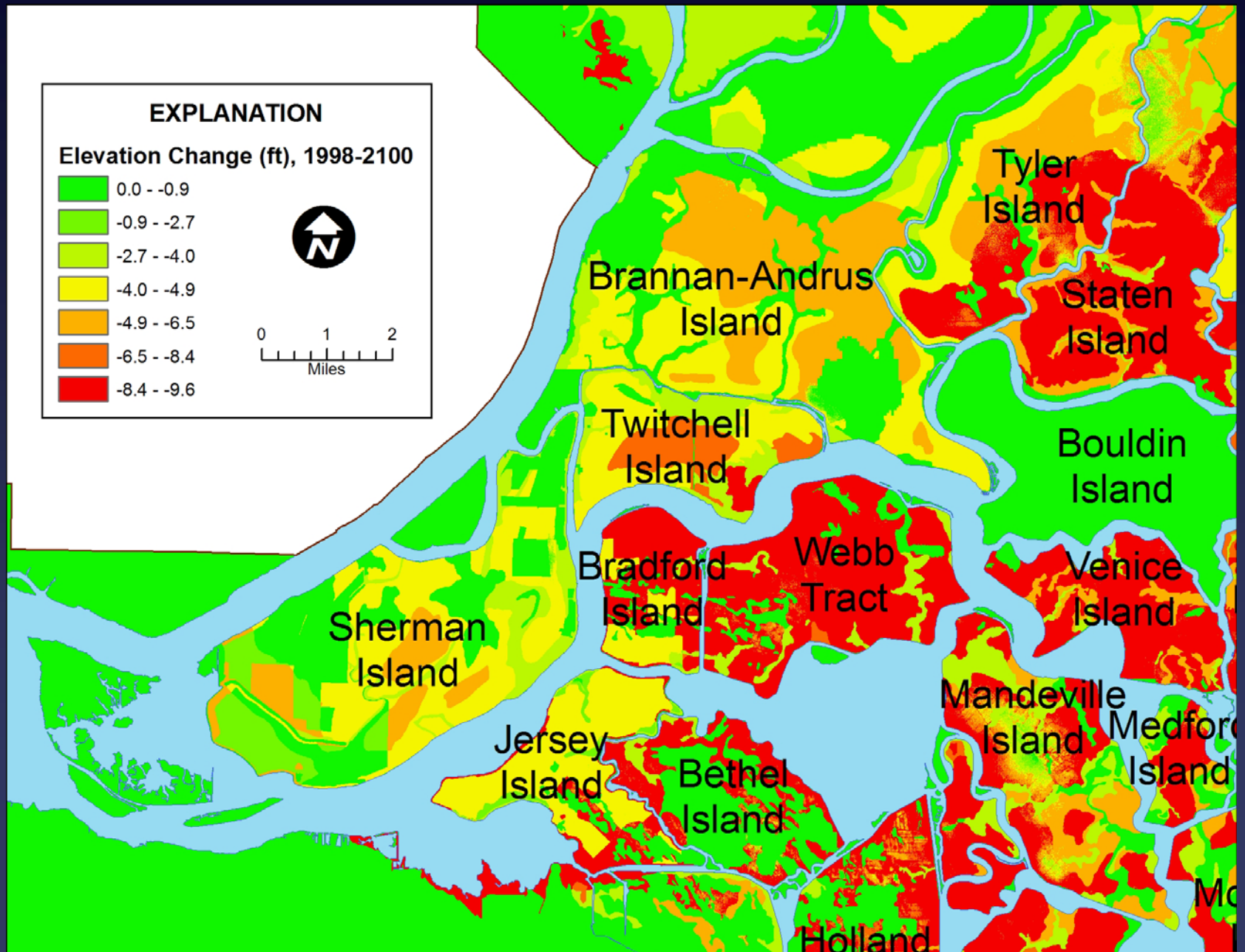
# Recognition: Sea Level Rise



Source:  
IPCC, 2001



# Western Delta 2100



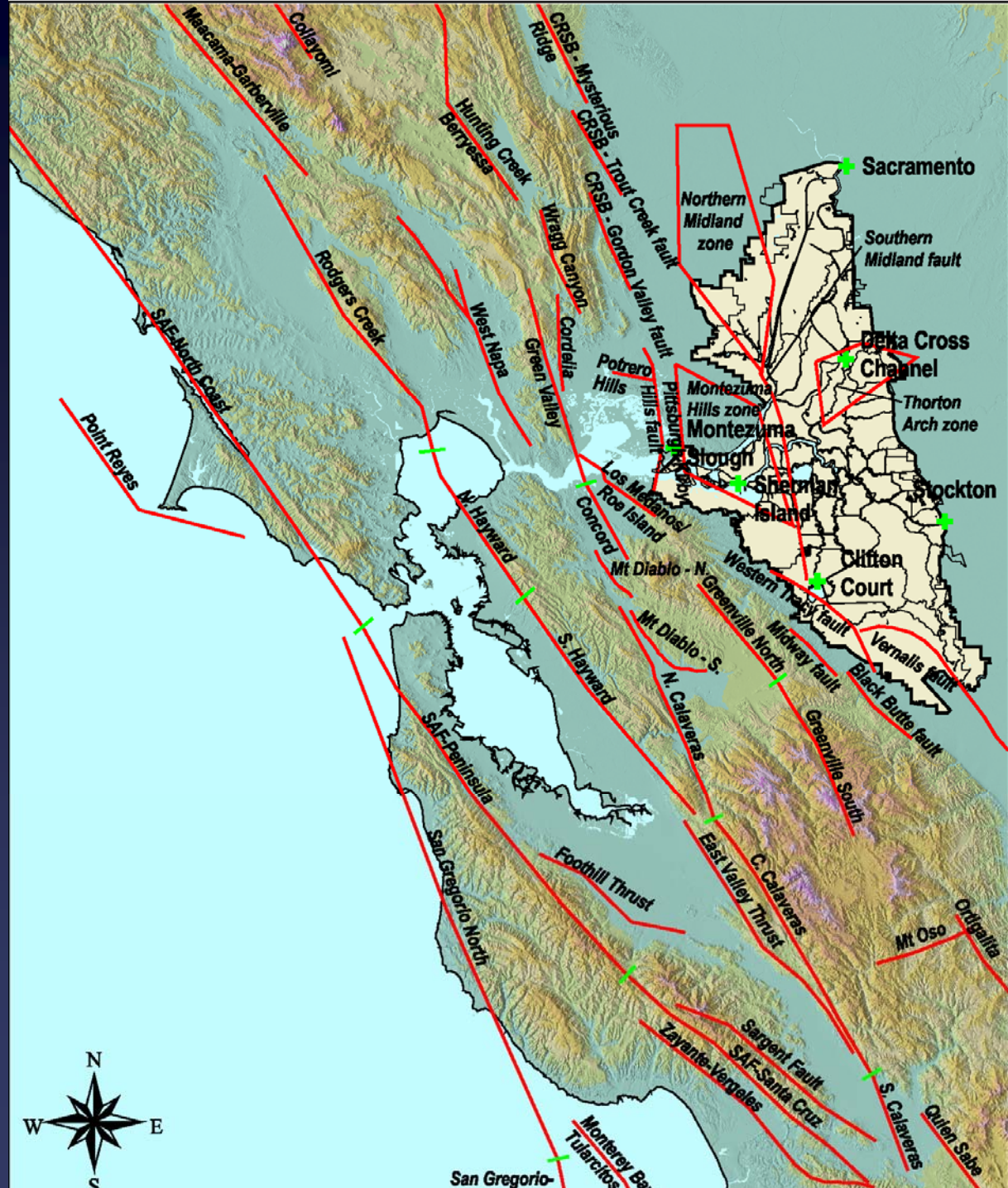


## Multiple Sand Boils – San Joaquin River (January 1997)





# Bay Area Fault Map





# Collapse of Moss Landing Marsh Levee Following 1989 Loma Prieta Earthquake



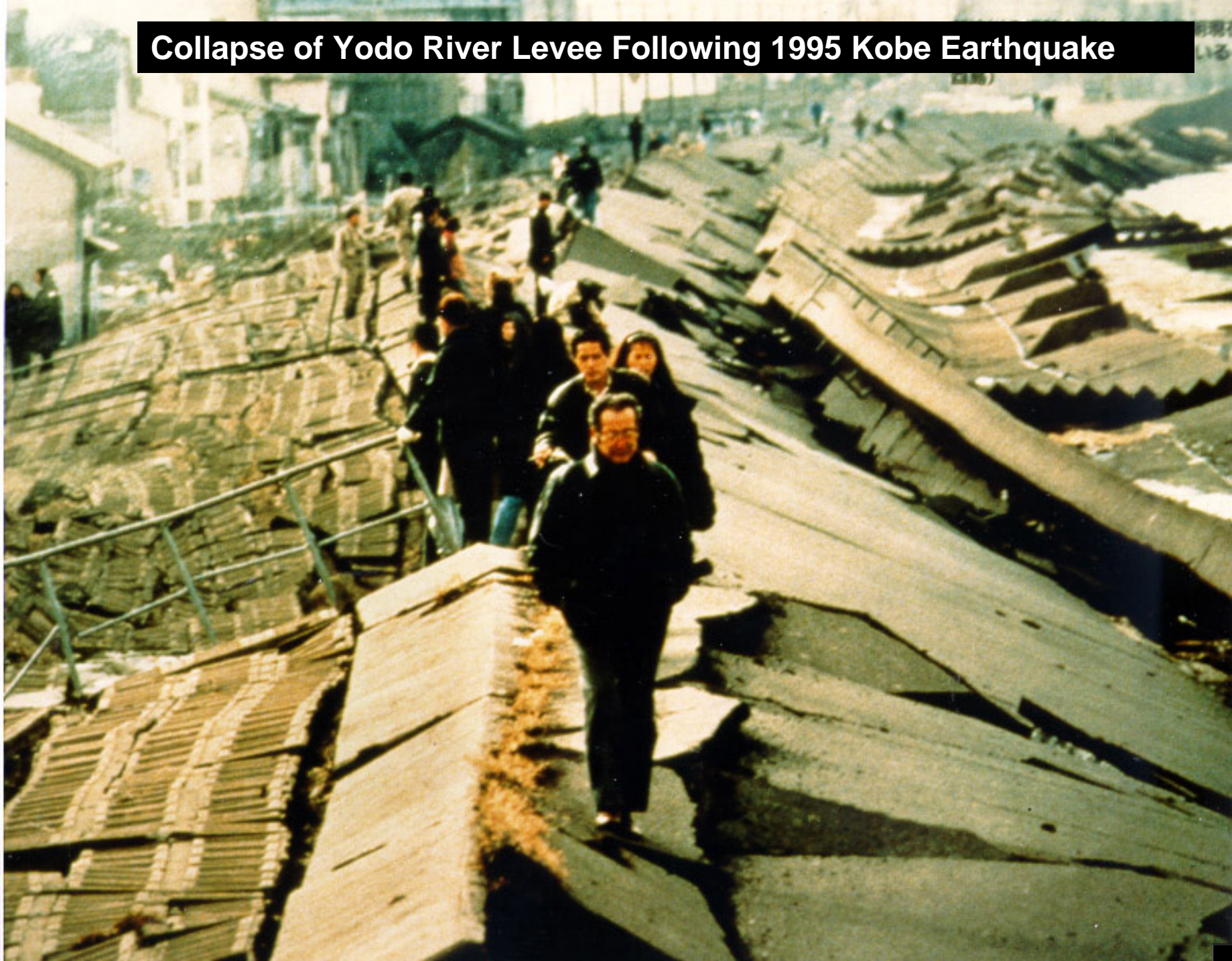


## Moderate Damage to Yodo River Levee Following 1995 Kobe Earthquake



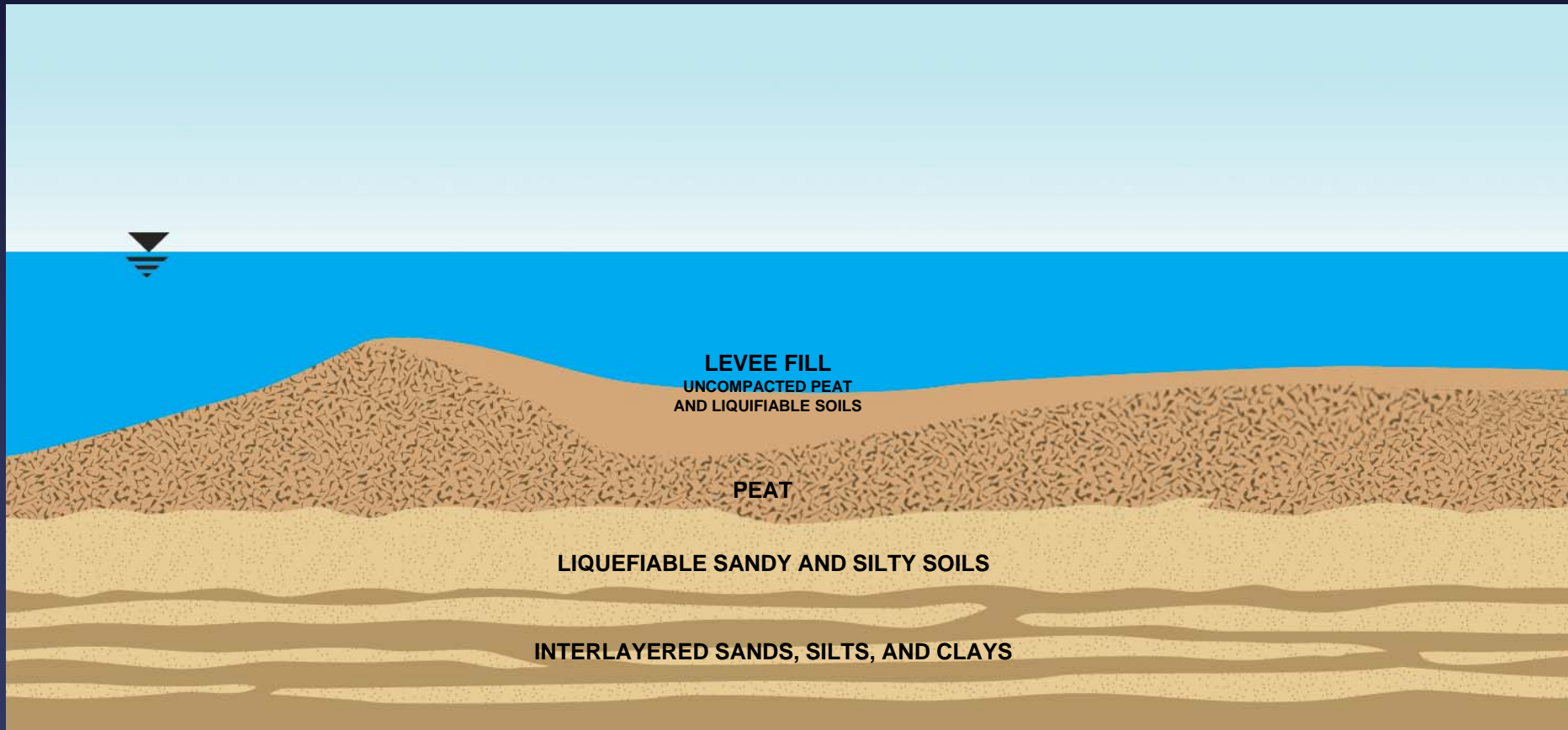


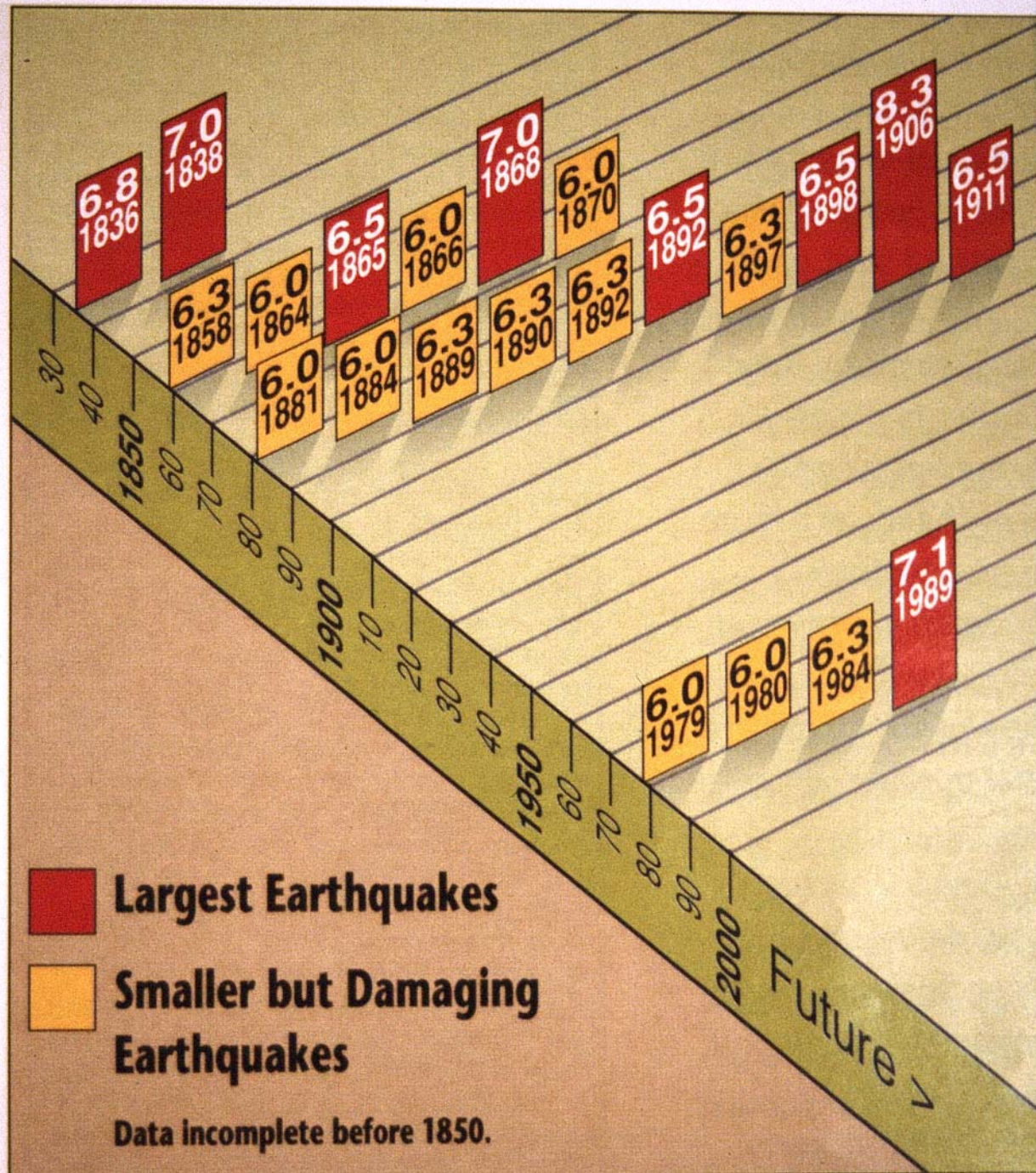
**Collapse of Yodo River Levee Following 1995 Kobe Earthquake**





## How a Delta Earthquake Could Devastate California's Economy







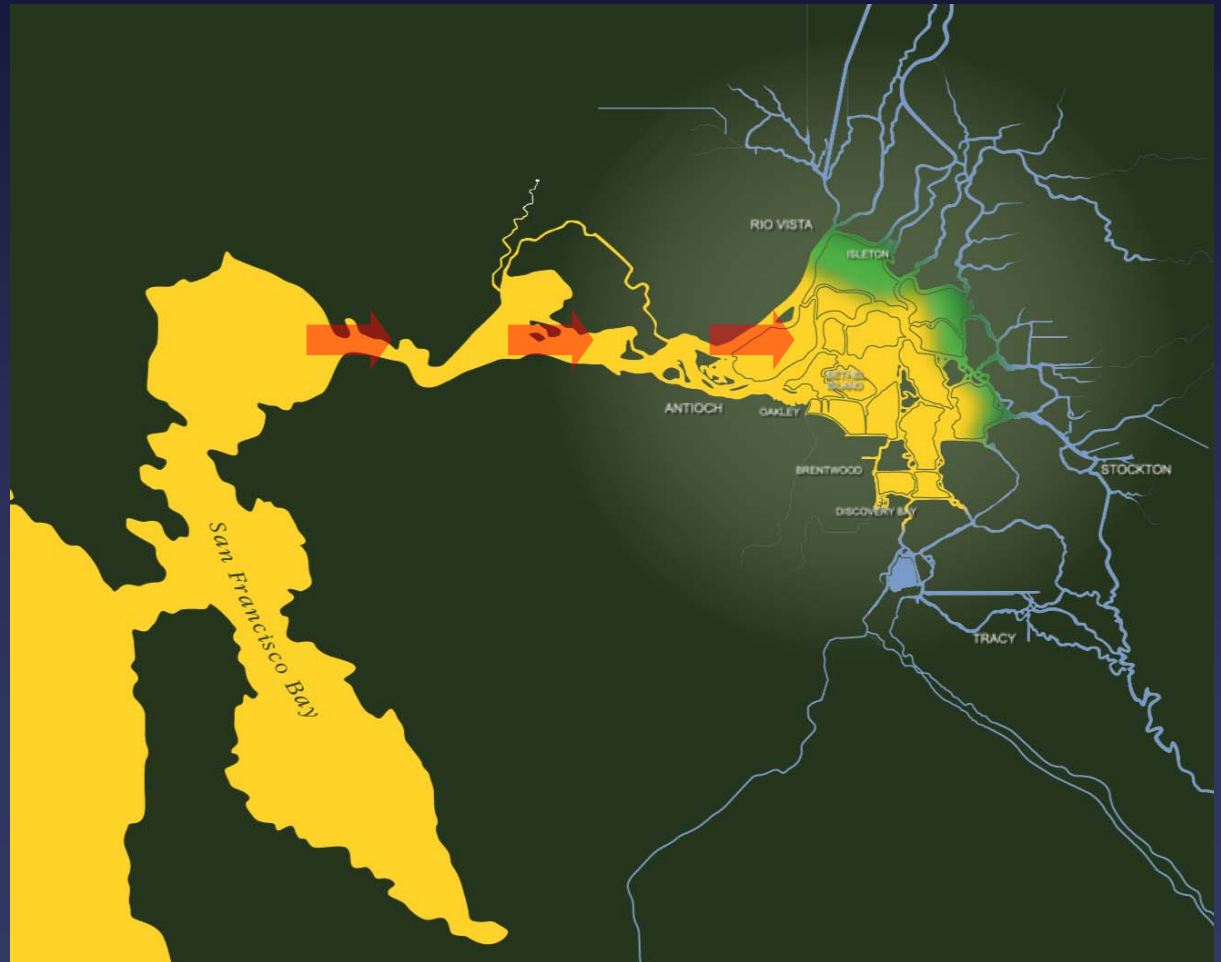
# Sustainability Issues: Catastrophic Earthquake-induced Levee Failures

- Magnitude 6.5 Earthquake Scenario
- 30 levee breaches
- Flooding of 16 islands



## When the Delta Levees Fail

- 300 billion gallons of salt water flow into the Delta in first few days



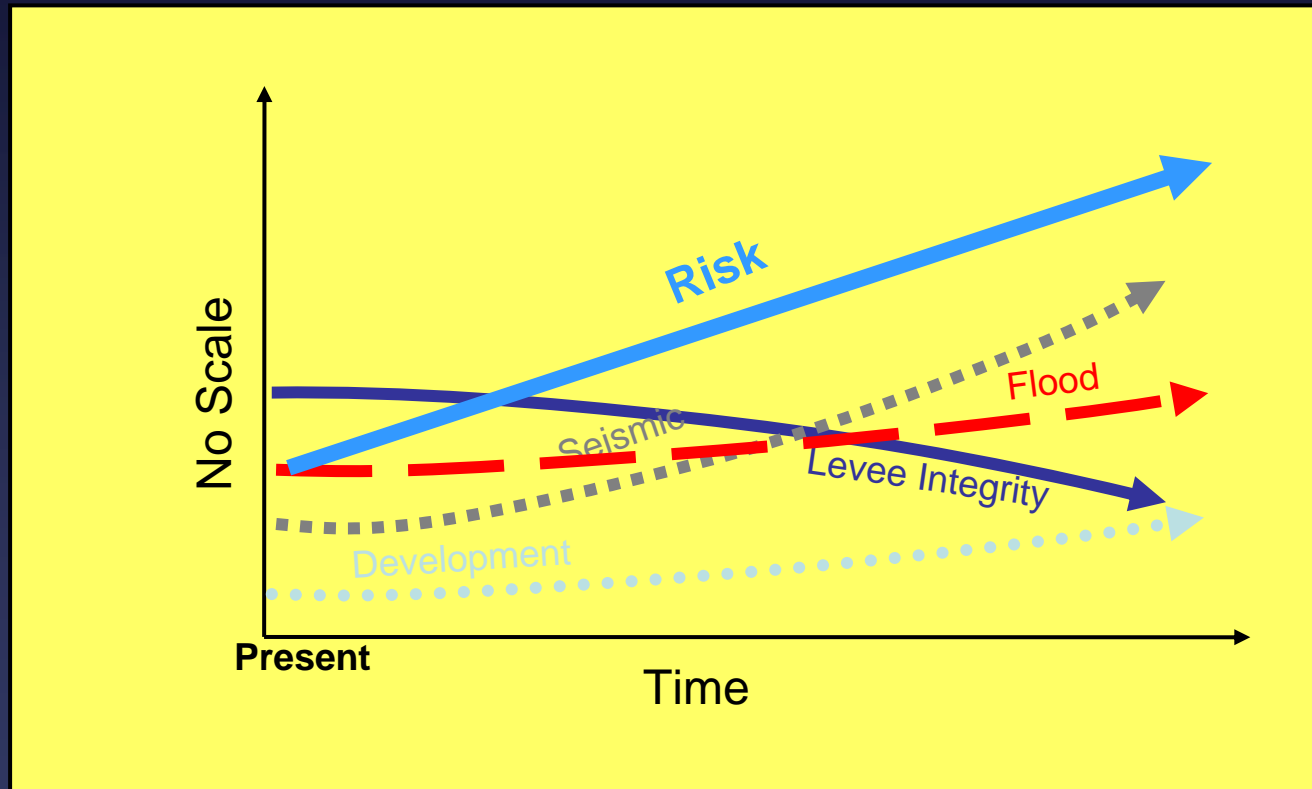


# Delta Risk Management Strategy

## Phase 1 Risk Evaluation

- **Development of a Risk Analysis to Evaluate the Impact to Delta Levees from:**
  - **Floods**
  - **Earthquakes**
  - **Subsidence**
  - **Climate Change**
  - **Unexpected failures**
- **Determine Consequences to Economy & Eco-System based on Risks Found**

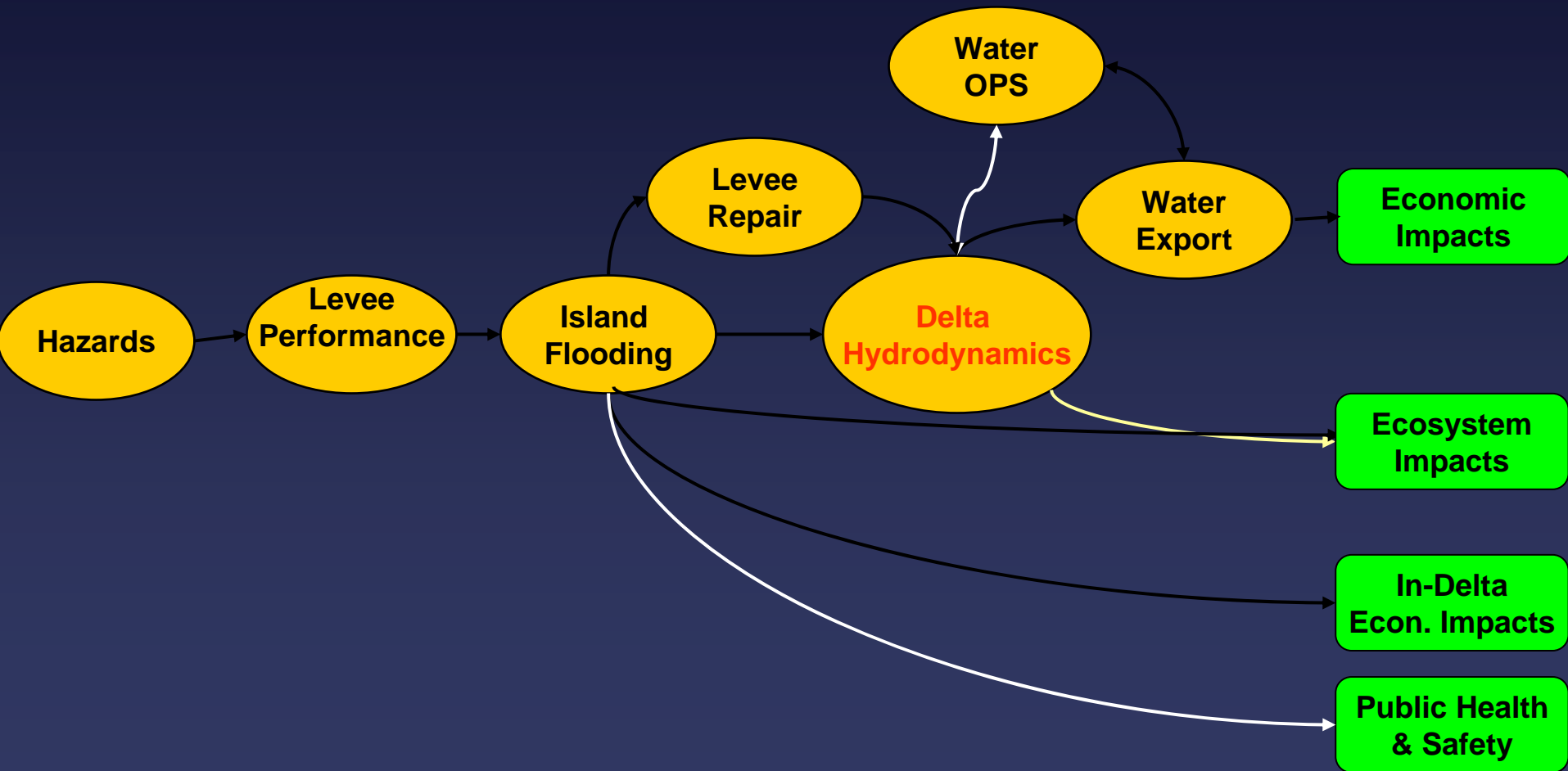
# Risk Picture





# Phase 1 DRMS Risk Analysis

## Elements of the Analysis





# DESPAIR

It's Always Darkest Just Before it goes Pitch Black



# Delta Risk Management Strategy

## Phase 2: Development and Evaluation of Risk Reduction Strategies

- Develop a menu of risk reduction measures that could reduce risk
- Package the measures into different combinations/scenarios
- Use Risk Model to evaluate potential risk reductions
- Evaluate benefits and costs of risk reduction measures

# Delta Risk Management Strategy

## Alternative Risk Reduction Strategies:

Levee Structural Improvements

Improved Levee Maintenance

Plan-form Changes

Ecosystem Enhancement

Improved Emergency Response

Subsidence Reduction

Subsidence Reversal

Land Use Changes @ Levee

Land Use Changes on Islands

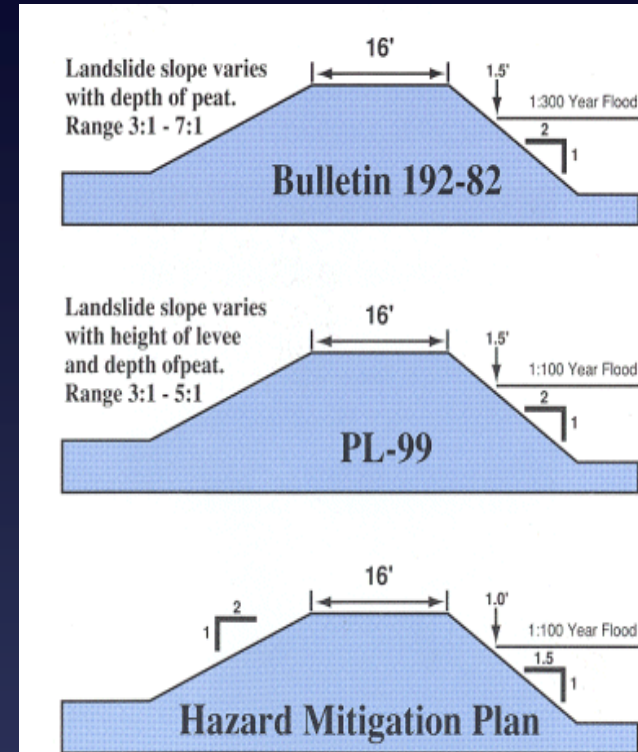
Pre-flooding of Islands

Water Operations

Permanent, Operable Barriers

Temporary Barriers

New Facilities





# Delta Risk Management Strategy

## Tentative Project Schedule

2007

2008

April

May

June

July

August

September

October

November

December

January

### DRMS PHASE I Report

Admin.  
Draft  
4/23

St. Comm.  
Submits  
Comments  
5/25

Final  
Draft  
6/15

Final  
Report  
8/15

IRP Review

6/15

7/27

### DRMS PHASE II Report

St. Comm.  
Recommends  
Scenarios  
6/5

Admin.  
Draft  
8/3

St. Comm.  
Submits  
Comments  
9/4

Final  
Draft  
10/1

Final  
Report  
11/20

IRP Review

10/1

10/31

### DELTA VISION PROCESS

DV Meeting  
4/27

DV Meeting  
5/25?

Delta Vision Submits Vision of  
Sustainable Delta to Legislature  
1/01/08